Reconnaissance System Survey

Introduction

It is proposed that a study team be formed consisting of four or five cleared people from each of three contractors (Hycon, Lockheed, and Ramo Wooldridge), who would be directed to evaluate both existing systems and systems now in process for their intelligence gathering capability.

There appears to be an urgent requirement for a comprehensive survey of the possible means for maintaining surveillance of the Soviet Union. This survey should be initiated immediately in order that the best possible information will be available before expensive and far reaching decisions need to be made.

Hycon possesses an unusual capability for such a study. Hycon has been intimately involved in nine of the ten systems which are briefly outlined in this report and in several of them, notably the A2C, Omer, and X-15, Hycon has initiated the concept of using these vehicles for reconnaissance. Hycon is presently working with North American on the X-15 concept and with McDonnel Aircraft Corporation on the Mercury capsule.

Additionally Hycon still has virtually all of the key personnel responsible for the design of the 73-B Configuration who are fully cognizant of the problems involved in photo intelligence gathering. This combination of cleared personnel already familiar with most of the programs together with the large amount of pertinent material already in the company files offers an opportunity for a fast and comprehensive review of intelligence gathering possibilities. This review should be of great value in making the crucial decisions now imminent.

Scope

The study envisioned would include a survey of the technical parameters of existing and projected vehicles and the relationship of these parameters specifically to the reconnaissance problem. Additionally in a second phase the study would examine the reconnaissance vehicles which could be used in conjunction with large boosters such as Saturn. Cognizance should be taken of the possibilities of power plants even further in the future such as nuclear rockets. It is important that the reconnaissance possibilities of such future systems be evaluated at the earliest possible point in time owing to the fact that short of an all out war the only positive use of these power plants lies in their employment for reconnaissance. In order that the reconnaissance aspect can be properly planned and funded it is essential that the basic concepts of reconnaissance be defined at an early stage.

Cost

Phase I, the consideration of existing and planned systems, would require ninety (90) to one hundred twenty (120) days, would involve fifteen to twenty engineers with supporting staff and would cost approximately $175,000.

Phase I Study

In the following presentation existing vehicles are briefly outlined together with a table showing some of the proposed photographic systems. It is proposed that consideration of these vehicles for reconnaissance systems form the basis of Phase I of the study.

Phase II would be a natural follow-on effort to the completion of this work.

I. Unmanned Aerodynamic Systems

System	Power	Range n. m.	Altitude X1000 feet	Velocity ft/sec.	Duration Hours	Recovery	Operational Date
1. Q2C Drone	Turbojet	2200	65	800	5	Vehicle by Parachute	early 1961
2. Omer II C	Turbojet	2000	58	2000	1-3/4	Film Capsule by parachute	early 1961
3. Omer II D	Ramjet	3000	85	2000	2-1/2	Film Capsule by parachute	early 1963
4. X-7	Ramjet	500	80	3000	1-1/2	Vehicle by parachute	mid 1963
5. X-7 Follow On	Ramjet	1500	100	4000	3	Vehicle by parachute	mid 1965

The systems tabulated in Table I are unmanned. They are further characterized by the fact that they operate within the region of aerodynamic lift. These characteristics would be advantageous under certain operational conditions.

1. Q2C Drone. This system utilizes a re-configured Ryan Q2C Drone as the reconnaissance vehicle. Modifications consist essentially of lengthening fuselage, increasing wing span, and providing increased fuel capacity. This configuration would probably be the least expensive and could become operational within the shortest time span. Its 2200 mile range and 65,000 foot ceiling would probably preclude its employment except in special missions or in tactical use.

2. Omer. Omer I, a test program utilizing the existing GAM-77 missile, is not tabulated because of its relatively short range of 760 n. miles. The vehicles for Omer II C and II D are modifications of the follow-on version of the current GAM-77 Hound Dog missile. Vehicle modifications for Omer II C involve lengthening the missile fuselage and increasing diameter to provide increased fuel capacity for longer range. Modifications for the Omer II D version involve further lengthening of the fuselage and the use of a ramjet engine in place of

the existing turbojet. The system concept provides for use of photographic, infrared, and elint reconnaissance equipment. Gross weight of Omer vehicles is low enough to maintain the B-52 air launch feature of the basic GAM-77 missile.

3. X-7. The X-7 and the follow-on program utilize the basic ramjet missile as a carrier vehicle. The present reconnaissance approach is to utilize this system for high altitude, high speed mapping. The suggested camera configuration includes two six-inch mapping cameras in addition to the 24 inch camera. The X-7 vehicle is ground launched.

II. Manned High Altitude Aircraft

	System	Power	Range n. m.	Altitude X1000 feet	Velocity ft/sec.	Duration Hours	Recovery	Operational Date
1.	B-70	Chem fuel jet	5000	120	3000	4+	Vehicle land	Mid. 62
2.	Reconnaissance Version		4000	120	3000	3	Vehicle land	Early 63
3.	X-15, modified	Rocket	6500	400	13000	3	Vehicle land	Mid 63

1. B-70. This reconnaissance system is envisioned as being basically the 110 A/L reconnaissance system originally planned as part of the B-70 Weapons System. Reconnaissance equipment for this vehicle will be photo, infrared, and electronic.

2. Reconnaissance Version. This system would involve the development of a special manned high altitude vehicle specifically for the reconnaissance mission. Its operating characteristics would be similar to those of the B-70 but it could be smaller in size because of the specific mission requirement. This system would have provision for photographic infrared, and electronic reconnaissance equipments.

3. X-15, Modified. This system would employ a modified X-15 as the reconnaissance vehicle. The modification consists of using a larger engine and increased fuel capacity to achieve the altitude and velocity required for a flyover mission. The payload compartment of the X-15 is large enough to accommodate a long focal length camera system with sufficient film load to provide large area coverage during one pass over the area of interest.

Both infrared and electronic intelligence systems as well as photo will be interchangeable payloads. The air launch feature of this system would also be an advantage provided the larger engine and added fuel weights are not too great. At present it appears that air launch from a B-70 rather than a B-52 is most feasible.

III. Orbital Vehicles

	System	Power	Range n. m.	Altitude X1000 feet	Velocity ft/sec.	Duration Hours	Recovery	Operational Date
1.	Recon Glider	Glide	One Orbit	260	24000	1-1/2	Vehicle Land	Mid 1962
2.	Mercury Capsule	Glide	Orbital	900	25000	4 to 24	Parachute Capsule	Early 1961
3.	Dyna Soar Flyover	Glide	One Orbit	300	25000	1-1/2	*Vehicle Land	Mid 1965
4.	Dyna Soar Orbital	Glide	Orbital	900	25000	4 to 60	*Vehicle Land	Mid 1965
5.	Samos	Glide	Orbital	1200	25000	30 days	*Parachute Capsule	Mid 1962

* Also Telemetering of some data.

1. Reconnaissance Glider. The reconnaissance glider concept involves the use of a vehicle designed specifically for reconnaissance. The vehicle will be essentially a space vehicle with altitude characteristics between the present X-15 and the projected Dyna Soar flyover configuration. The vehicle will be dart shaped, approximately 25 feet long and 10 feet wide at the widest point. Gross weight will be small enough to allow it to be ground launched by research rockets of the Scout type or air-launched from a B-70. The glider will be unmanned and capable of aerodynamic control on re-entry; so it will be landed by remote control. Payload weight will be in the order of 150 pounds which is sufficient for spot photographic coverage over the area of interest.

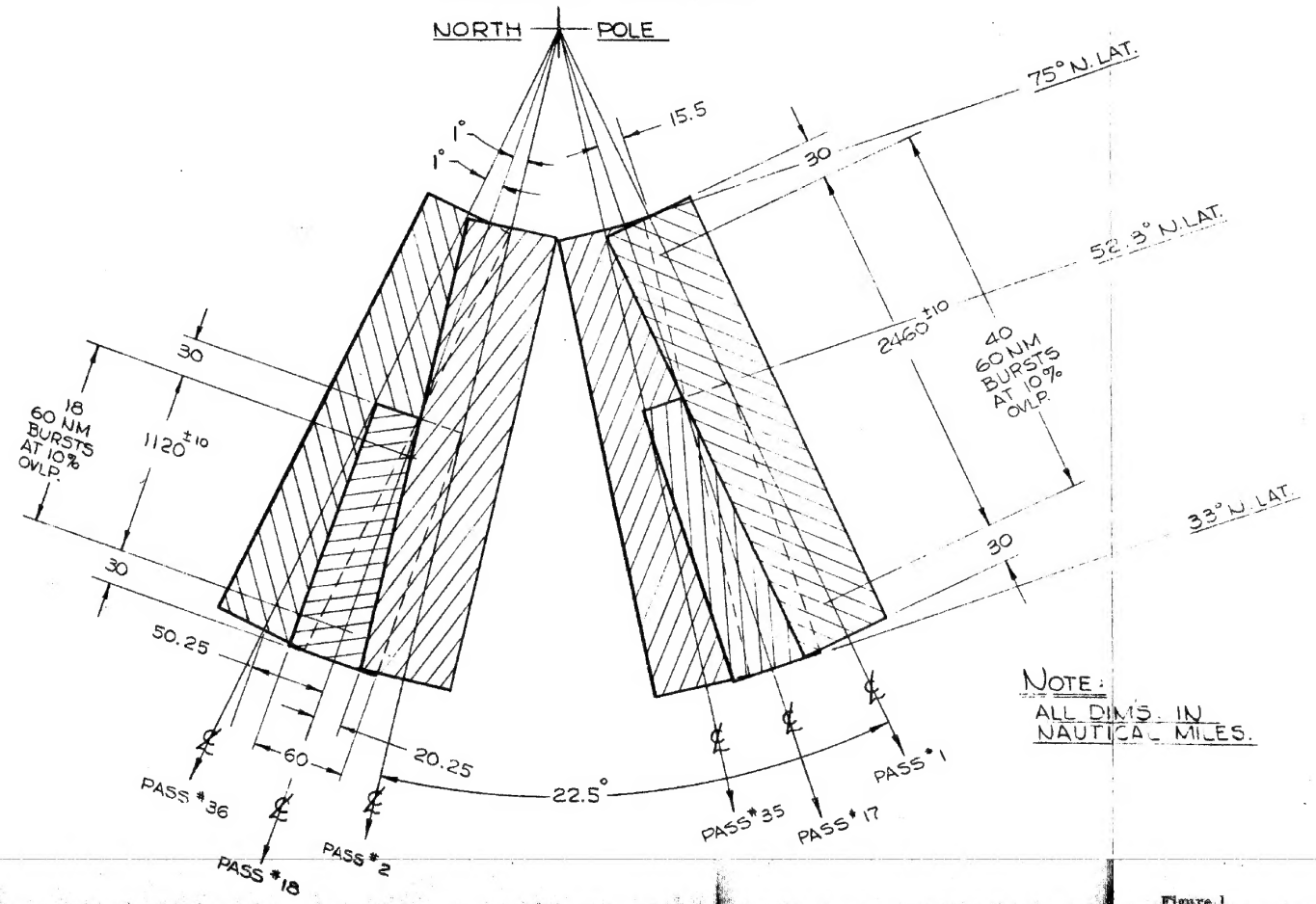
2. Mercury Capsule. In this configuration the space intended for the human occupant will be occupied by reconnaissance cameras (figures 1 and 2). Either a framing or panoramic type camera could be used with sufficient film load to provide detailed reconnaissance coverage during the course of approximately 40 orbits. A reconnaissance payload of sufficient quality could be available by late in 1960, and could be used during test shots of the capsule. Recovery of the data would involve recovery of the capsule.

3. Dyna Soar. The Dyna Soar reconnaissance concept involves two mission types, flyover or once around, and orbital. The basic vehicle will probably be the same for both missions; so reconnaissance packages will probably be interchangeable. Photo, infrared and electronic intelligence will be used, but the vehicle will probably not be ready before 1965.

4. Samos. Samos is an unmanned photo-reconnaissance satellite. The ground coverage afforded by this satellite is shown in Figure 1. On-board processing and telemetering of some data are features of some of the planned configurations as well as configurations allowing recovery of data after approximately 30 days. The first Samos flight will probably take place in 1961 equipped with a small short focal length camera which includes a photo transmission system. Telemetering photographic data has inherent limitations at present as regards to quantity of data returned with a long focal length camera will probably occur after 1962. With complete recovery of intelligence information, though some of the data would be 30 days old when received.

One possibility which suggests itself is a system capable of ejecting exposed film capsules at intervals of three or four days, which would give complete recovery of data and provide the timeliners which is lacking in the present concept.

LAND AREA COVERAGE
VERTICAL PHOTOGRAPHY



NOTE:
ALL DIMS. IN
NAUTICAL MILES.

Figure 1

HEURISTIC SKETCH OF SYSTEM IN MERCURY CAPSULE

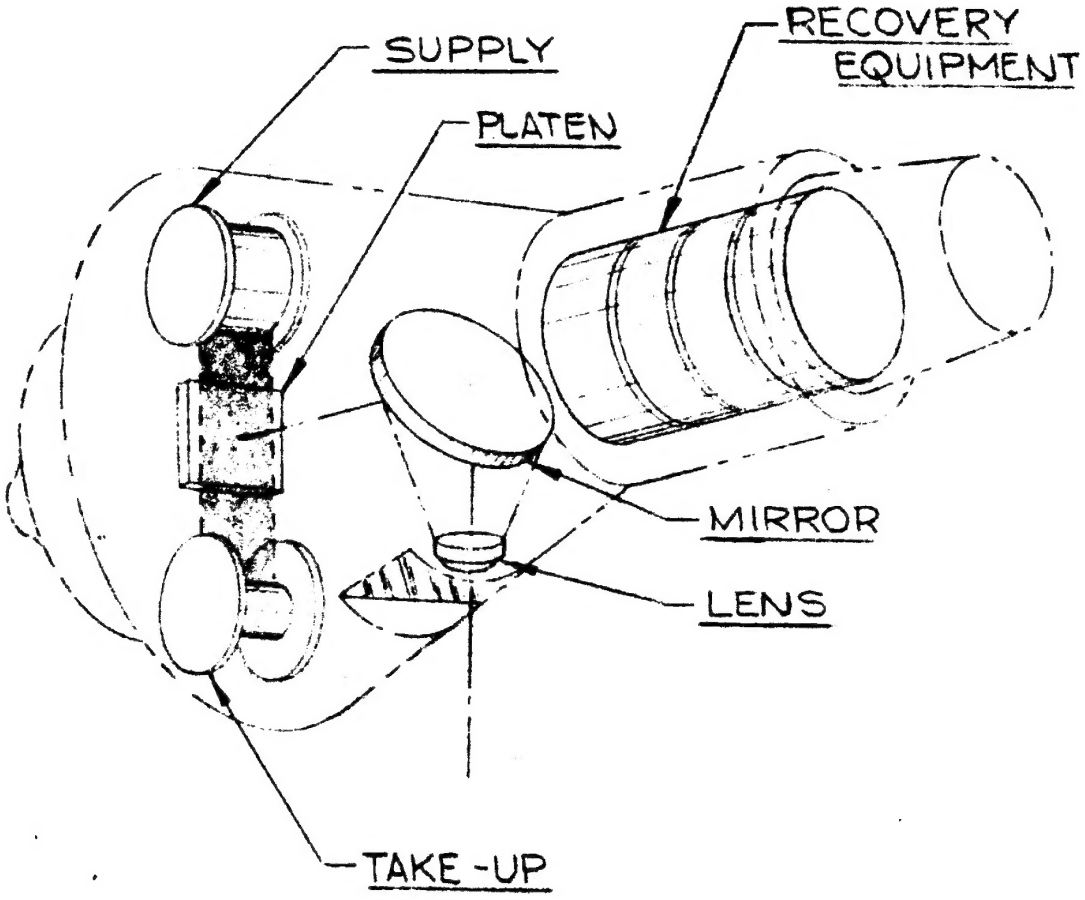


Figure 2

- 25 MAY 60 -
- SINRAM -

HEURISTIC SKETCH OF PANORAMIC CAMERA IN MERCURY CAPSULE

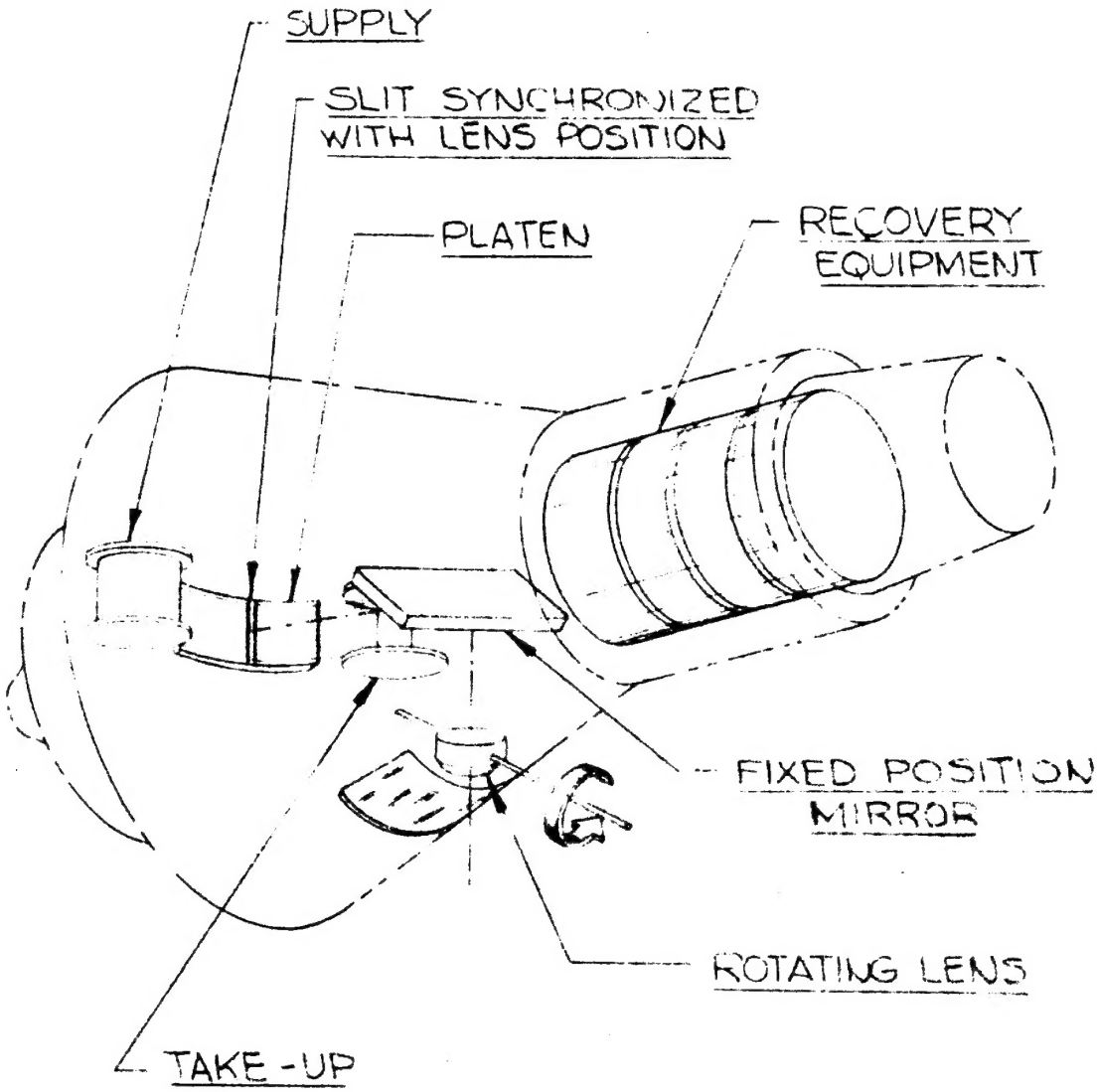


Figure 3

- 26 MAY 60 -
- SINRAM -

	System	Maximum Practical Coverage Along Flightline Width of Strip, n. m. ± 30°	± 45°	± 60°	Max. Photo Coverage of n. m.² Width of Strip, n. m.	Flightline n. m.	Total Area n. m.²	Photo Reconnaissance Equipment Characteristics Focal Length Inches	Film Load Feet	Format Size Inches	Payload Weight Pounds	Ground Recognition, Feet Theoretical Max. Attainable	Practical Max. Attainable Now	Remarks
1.	Q2C Drone	12-1/2	21-1/2	37	22-1/2	900	20,250	24	2500	9 x 9	150	0.23	2.1	General Surveillance
2.	Omer II C	11	19	33	15	1,800	27,000	36	4000	18 x 18	400	0.2	1.0	General Surveillance
	Omer II D	16	27	48-1/2	22	2,700	60,000	36	4600	18 x 18	500	0.2	1.5	General Surveillance
3.	X-7	15	26-1/2	45-1/2	17	530	9,000	24	700	9 x 9	150	0.3	2.6	Primarily Mapping
	X-7 Follow-on	15	26-1/2	45-1/2	17	530	9,000	24	700	9 x 9	150	0.36	3.2	Primarily Mapping
4.	Manned Hi-Alt A/C	22-1/2	39-1/2	68-1/2	65	2,000	130,000	36	6000	18 x 18	600	0.4	1.0	General Surveillance
5.	B-70	22-1/2	39-1/2	68-1/2	65	2,500	163,000	36	7500	18 x 18	700	0.4	1.0	General Surveillance
6.	X-15, Modified	76	132	228	105	11,400	1,200,000	36	4000	18 x 18	600	1.4	5.0	General Surveillance
7.	Recon Glider	49	85	148	32	1,450	46,500	48	750	18 x 18	150	0.9	2.5	Detail Spotting Only
8.	Mercury Capsule	171	297	512	135	15,400	2,075,000	60	4000	18 x 18	500	3.4	7.2	Detail Surveillance
9.	Dyna Soar, Flyover	57	100	171	5	675	3,380	100	300	9 x 9	400	1.1	2.0	Detail Spotting[2]
	Dyna Soar, Orbital	172	297	512	225	35,000	7,900,000	36	6000	18 x 18	400	3.3	7.2	General Surveillance[2]
10.	Samos	228	396	684	60	37,500	2,188,800	96	7500	18 x 18	700	4.3	5.0	Detail Surveillance

NOTES: 1. Minimum 60% Fwd. stereo overlap provided in all cases.
2. These two payloads interchangeable.

TABLE 4 - PARAMETERS OF CAMERA SYSTEMS PRESENTLY UNDER CONSIDERATION

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